

# Proximate Analysis

Prof Herb Ockerman 1960' 2X2 slides  
some script added in 15'

# PROXIMATE ANALYSIS

PERCENT

MOISTURE

PERCENT

FAT

PERCENT

PROTEIN

PERCENT

ASH

**SAMPLING**



Mix well so that the  
sample will  
represent the total



Also  
mix  
sample  
well

GRINDING AND MIXING



PERCENT MOISTURE

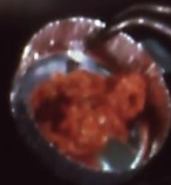
Weigh  
pan and  
sample



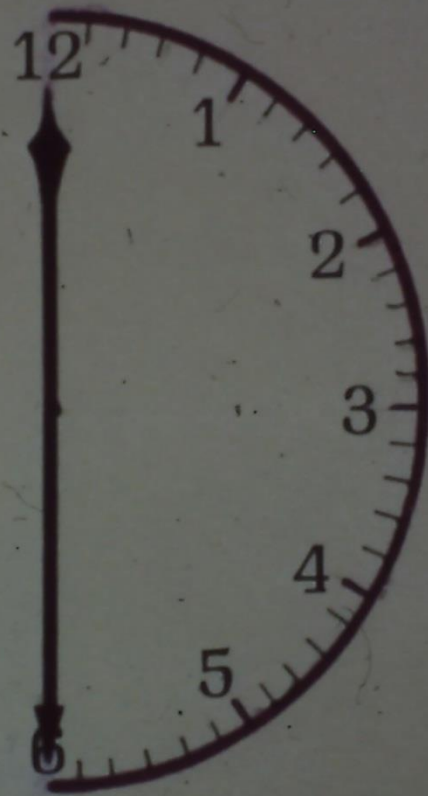
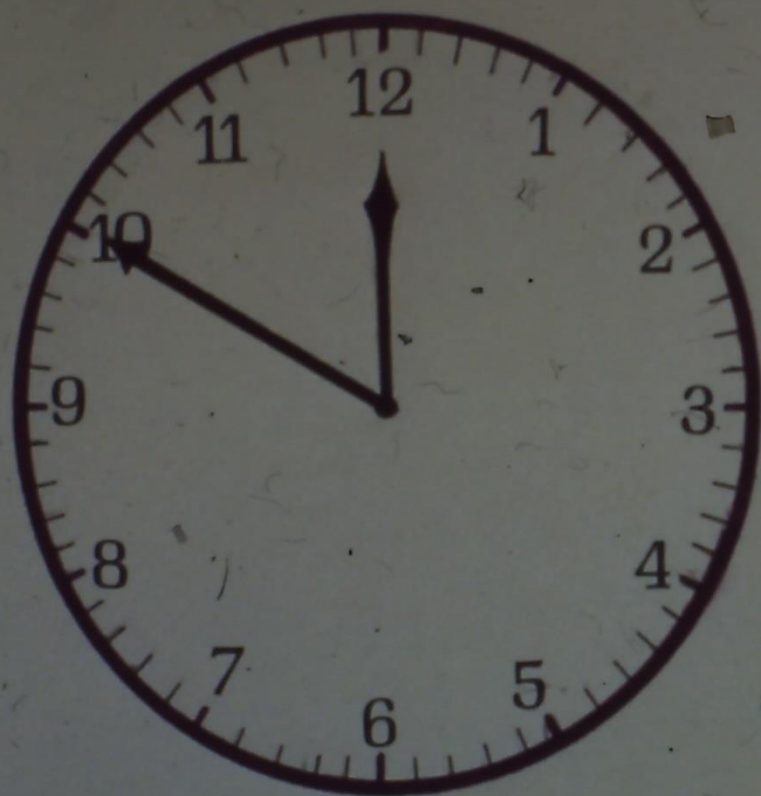


Dry  
sample

212°F







18 HOURS

Remove  
dried  
sample  
and pan

212 F





Cool pan  
and  
sample



Weigh  
cooled  
pan and  
sample



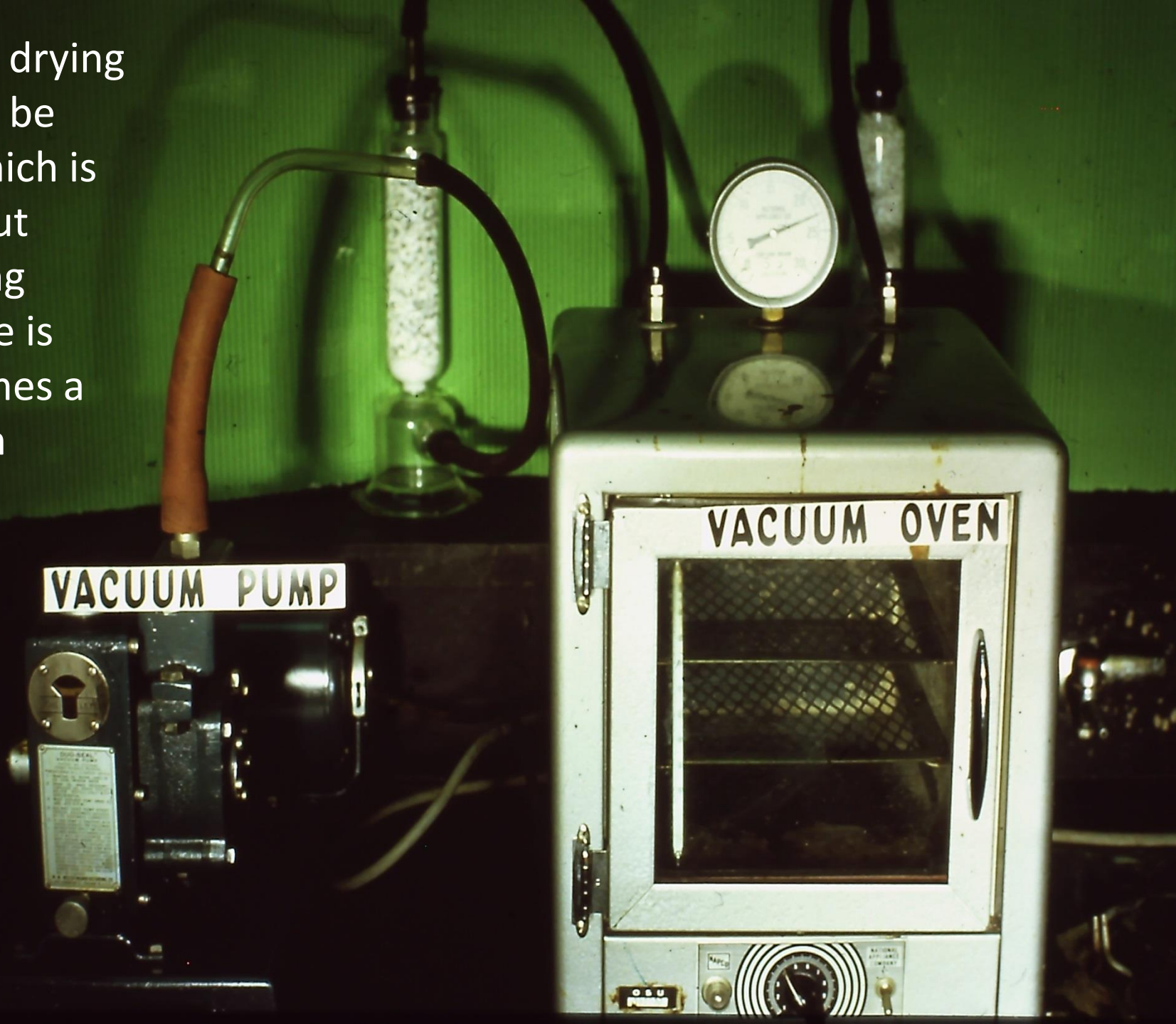


# MOISTURE DETERMINATION

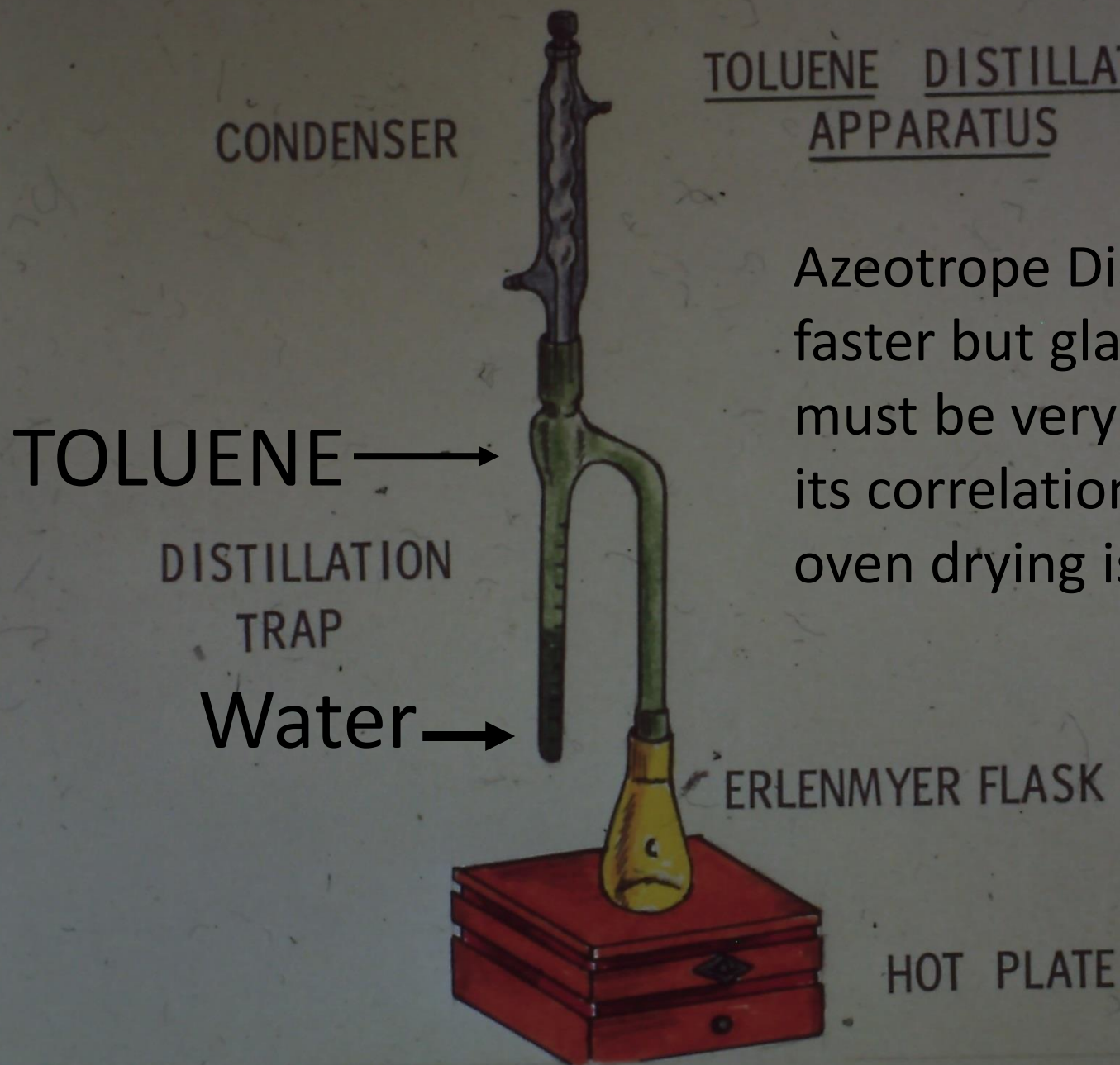
(1) 10g Wet wt.  
5g Dry wt.  
5g Loss in wt.

(2) 
$$\frac{5}{10} = .50 = 50\% \text{ Moisture}$$

Vacuum drying  
can also be  
used which is  
faster but  
capturing  
moisture is  
sometimes a  
problem



## TOLUENE DISTILLATION APPARATUS



Azeotrope Distillation is faster but glassware must be very clean and its correlation with oven drying is 0.02%



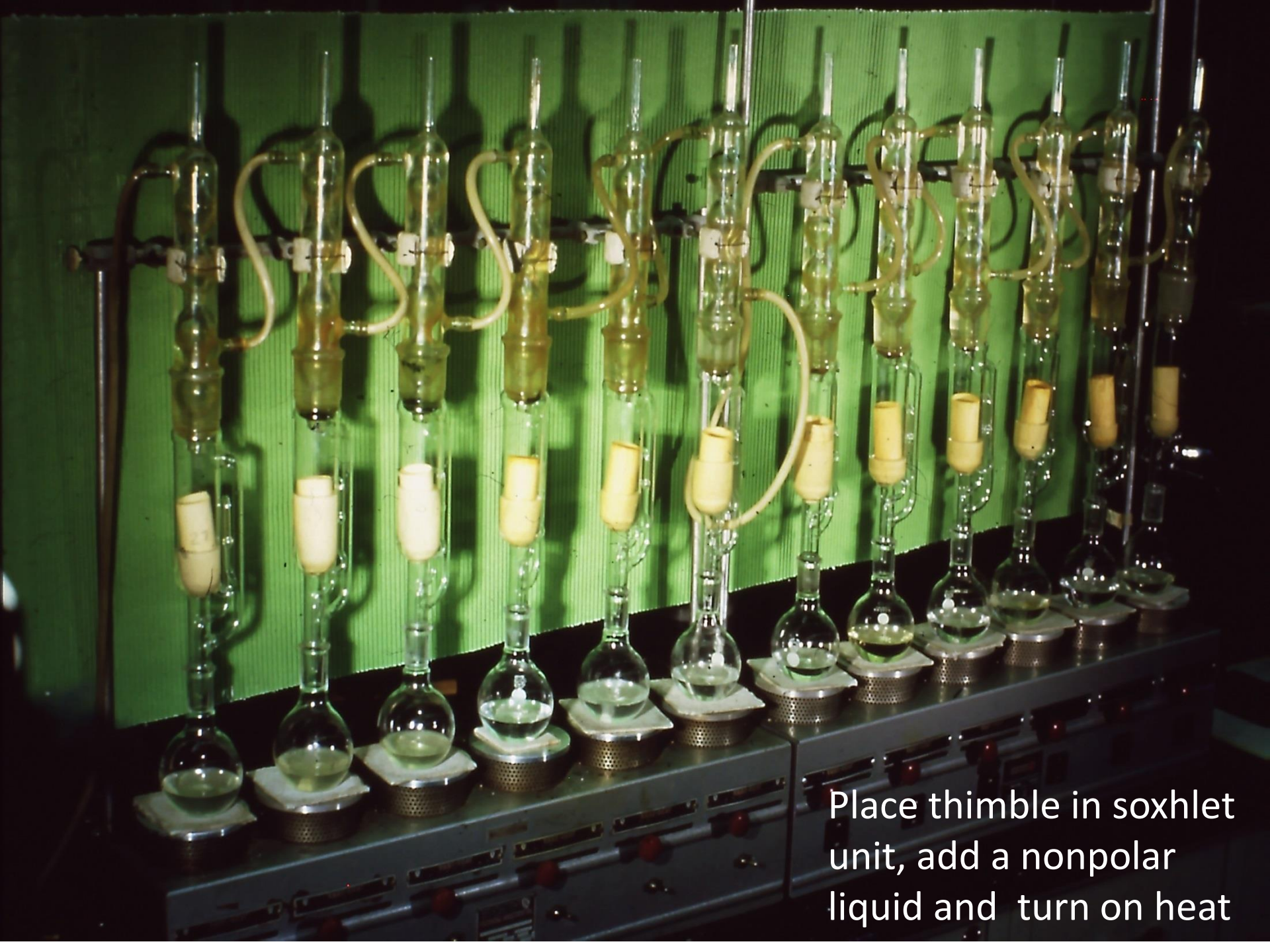
PERCENT CRUDE FAT

( ETHER EXTRACT )



Transfer  
dried sample  
into porous  
thimble  
using a non-  
porous  
liquid (ether  
often used)





Place thimble in soxhlet unit, add a nonpolar liquid and turn on heat



SOXHLET  
APPARATUS

Cold water  
CONDENSER

out

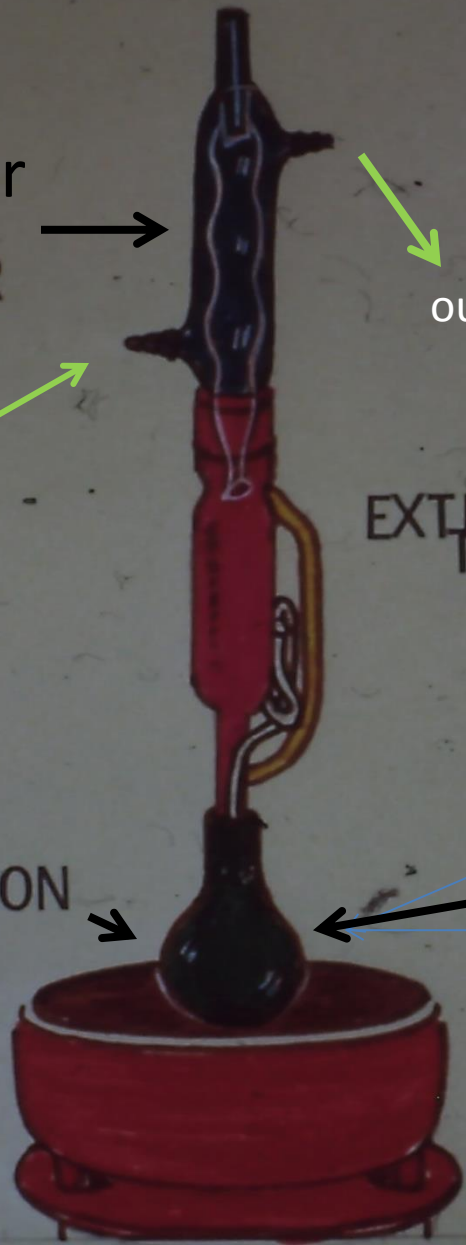
in

EXTRACTION  
TUBE

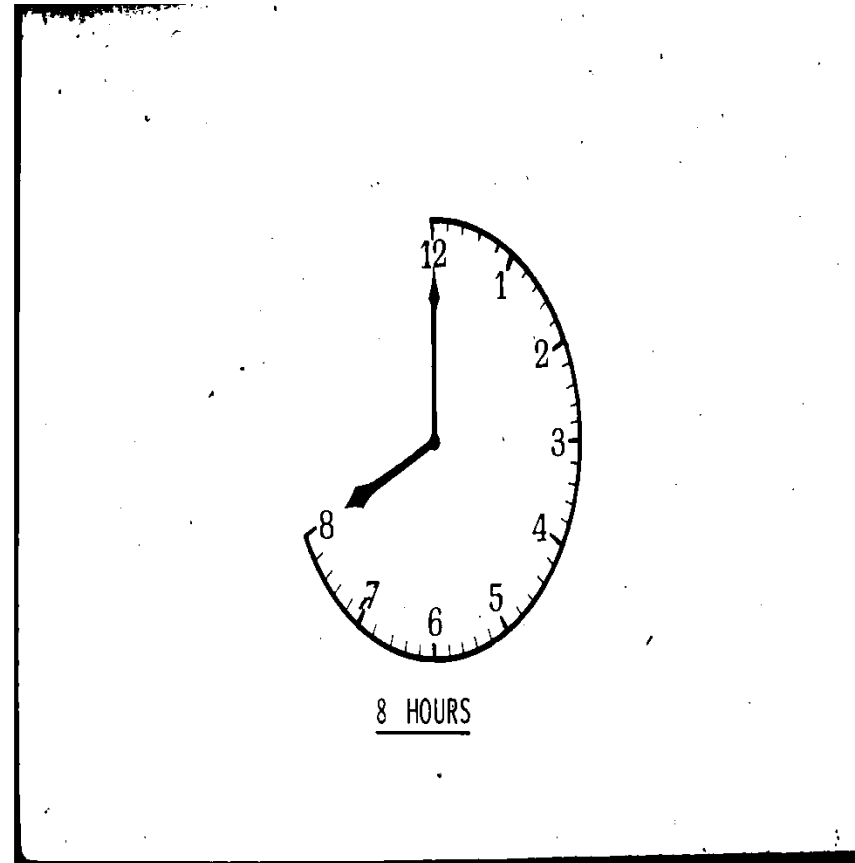
EXTRACTION  
FLASK

Non polar solvent washes fat from  
extraction thimble

HOT PLATE



Wash the fat from the sample  
with a nonpolar solvent for







212 F

Remove thimble  
containing  
washed sample  
from extraction  
unit and dry the  
sample in a  
drying oven

Weigh  
thimble  
and washed  
sample



## FAT EXTRACTION

(1) 10g Wet wt.

5g Dry wt.

2g Extracted wt.

3g Loss in wt.

(2)  $.30 = 30\% \text{ Fat}$

10 / 3.00



Babcock  
cheese  
bottle  
containing  
9 grams of  
sample

A hand is shown holding a knife, adding a small amount of a reddish-brown, chunky sample into a clear glass Babcock bottle. The bottle is placed on a light green surface. A white label with black text is positioned next to the bottle. The background is a green corrugated surface.

**9 GRAMS**



The side port  
is stoppered  
and acid is  
added to  
digest all but  
fat



**ADDING ACID**



To aid  
digestion the  
meat acid  
mixture is  
heated



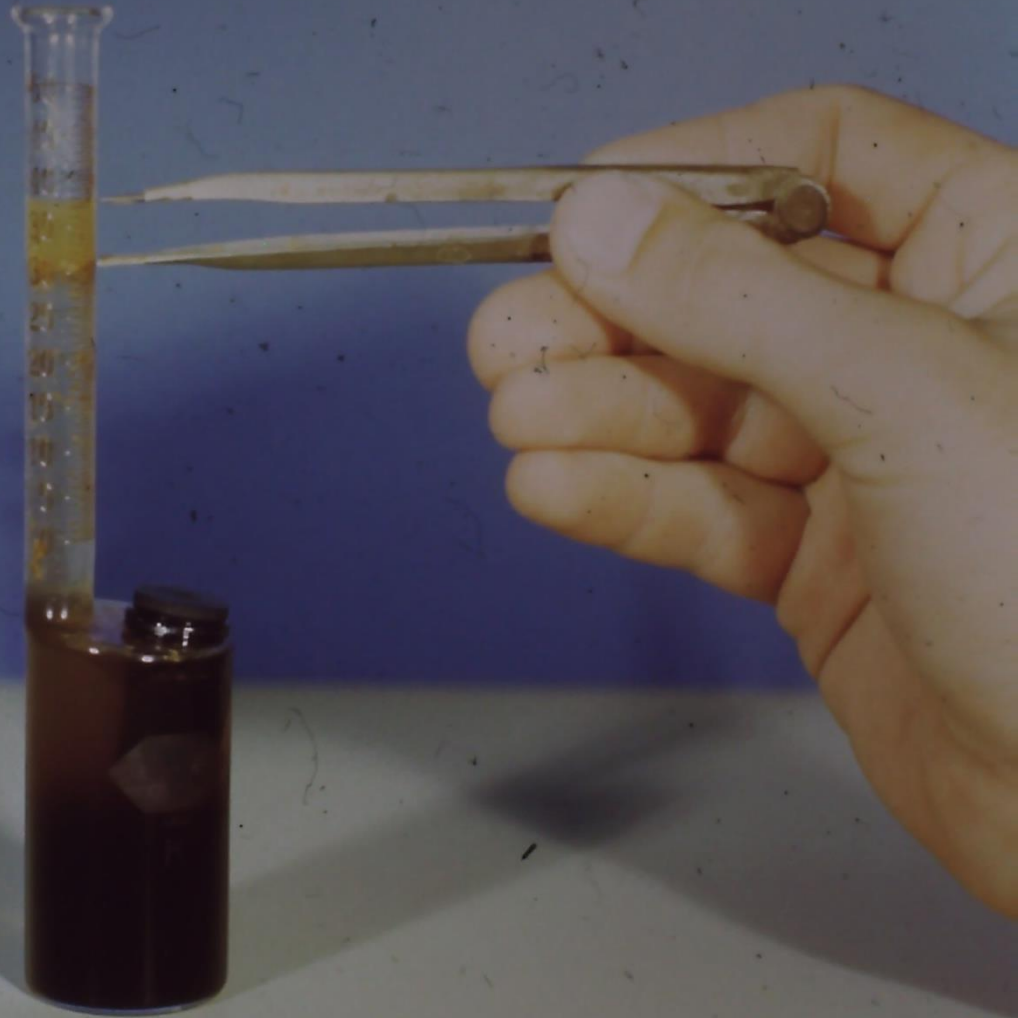


To encourage the fat to float on top of the liquid the bottles are placed in a centrifuge



The fat layer is  
then  
measured on  
the calibrated  
stem.

Correlation  
With non  
polar extract  
is 0.89



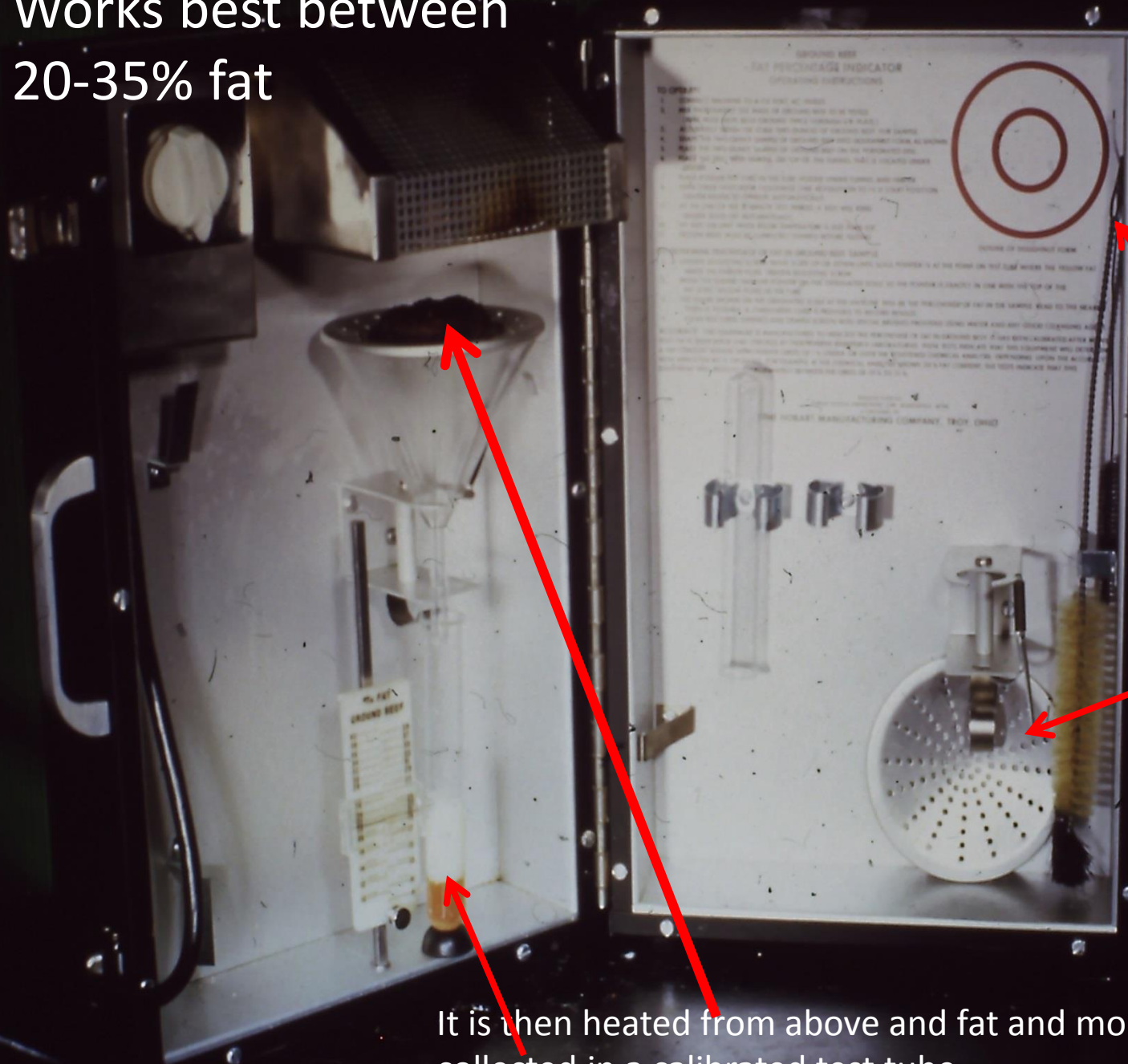
Works best between  
20-35% fat

Hobart fat  
analyzer

Meat is  
shaped  
like a  
donut

It is then  
placed on  
a funnel

It is then heated from above and fat and moisture is  
collected in a calibrated test tube



PERCENT

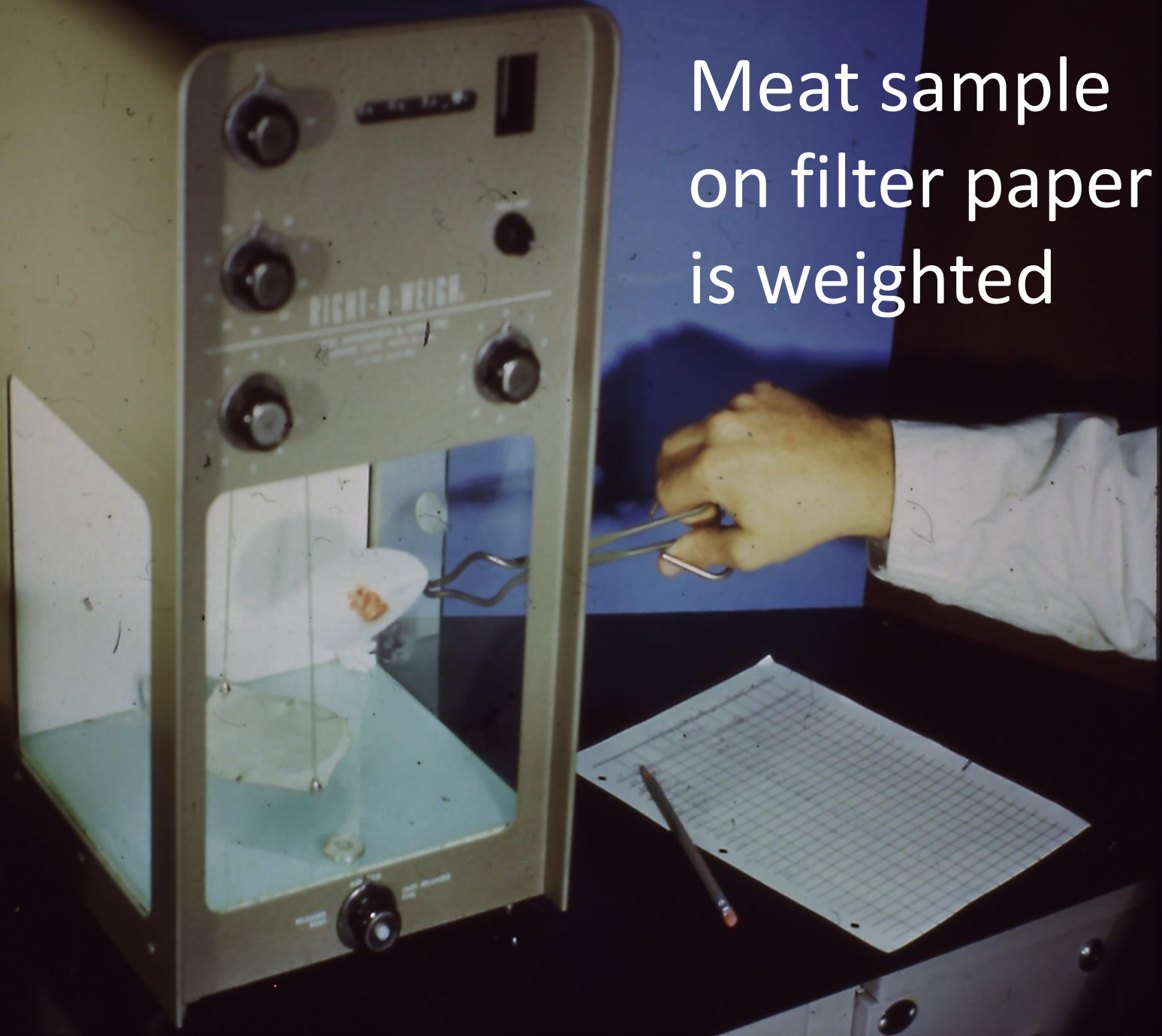
CRUDE

PROTEIN

( TOTAL NITROGEN )



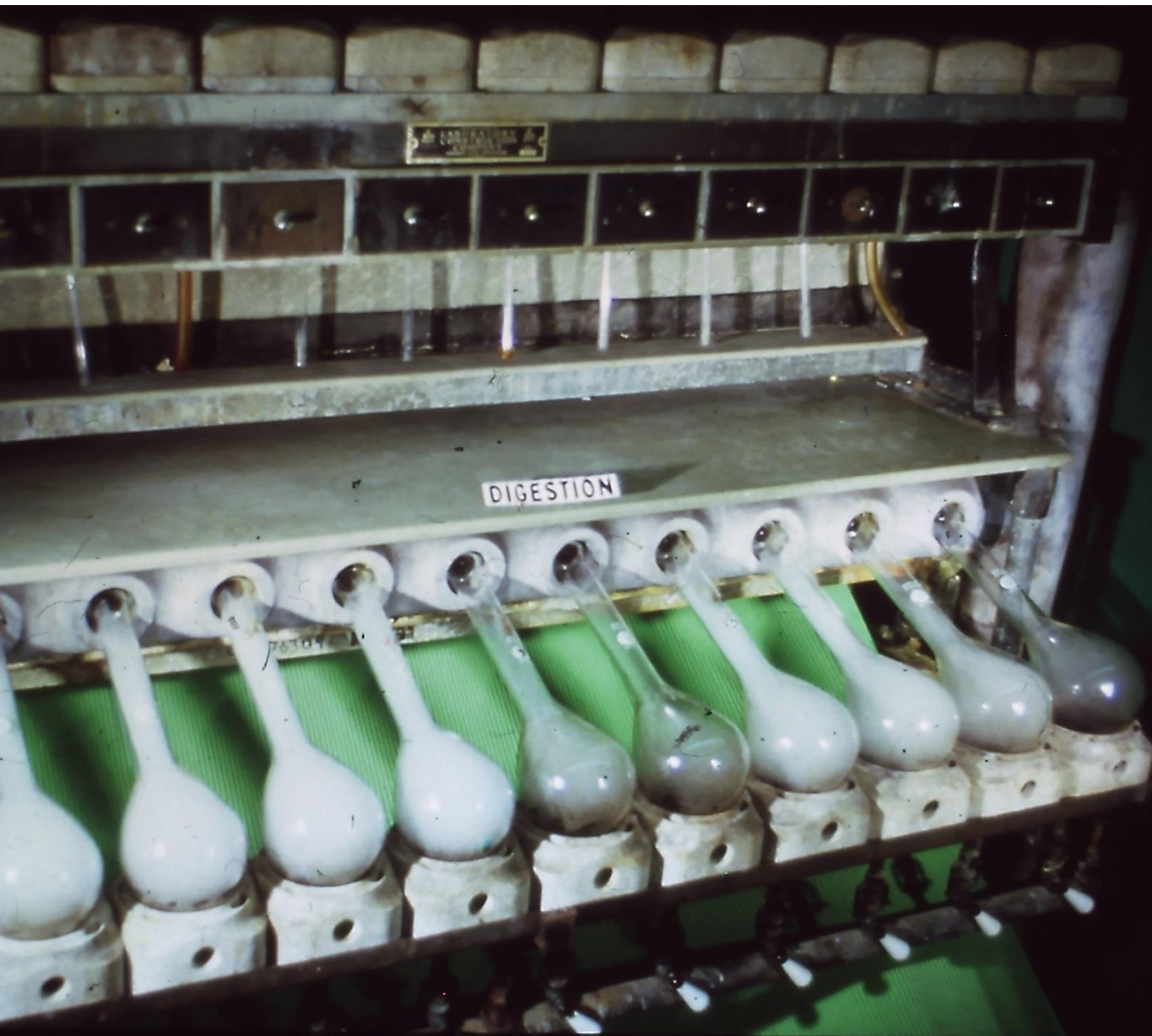
Meat sample  
on filter paper  
is weighted





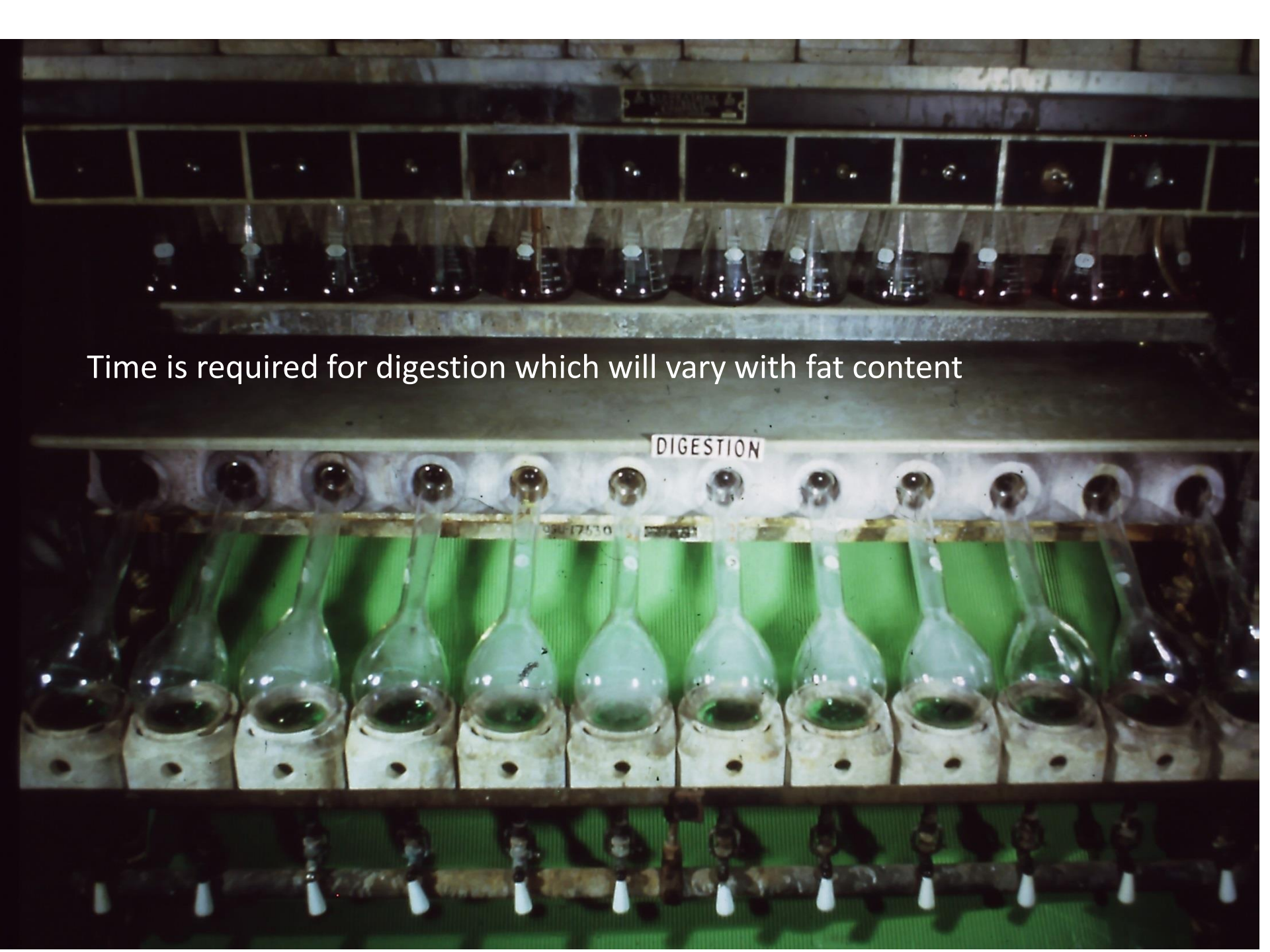
Meat and  
filter paper  
is placed in  
a Keldahl  
flask



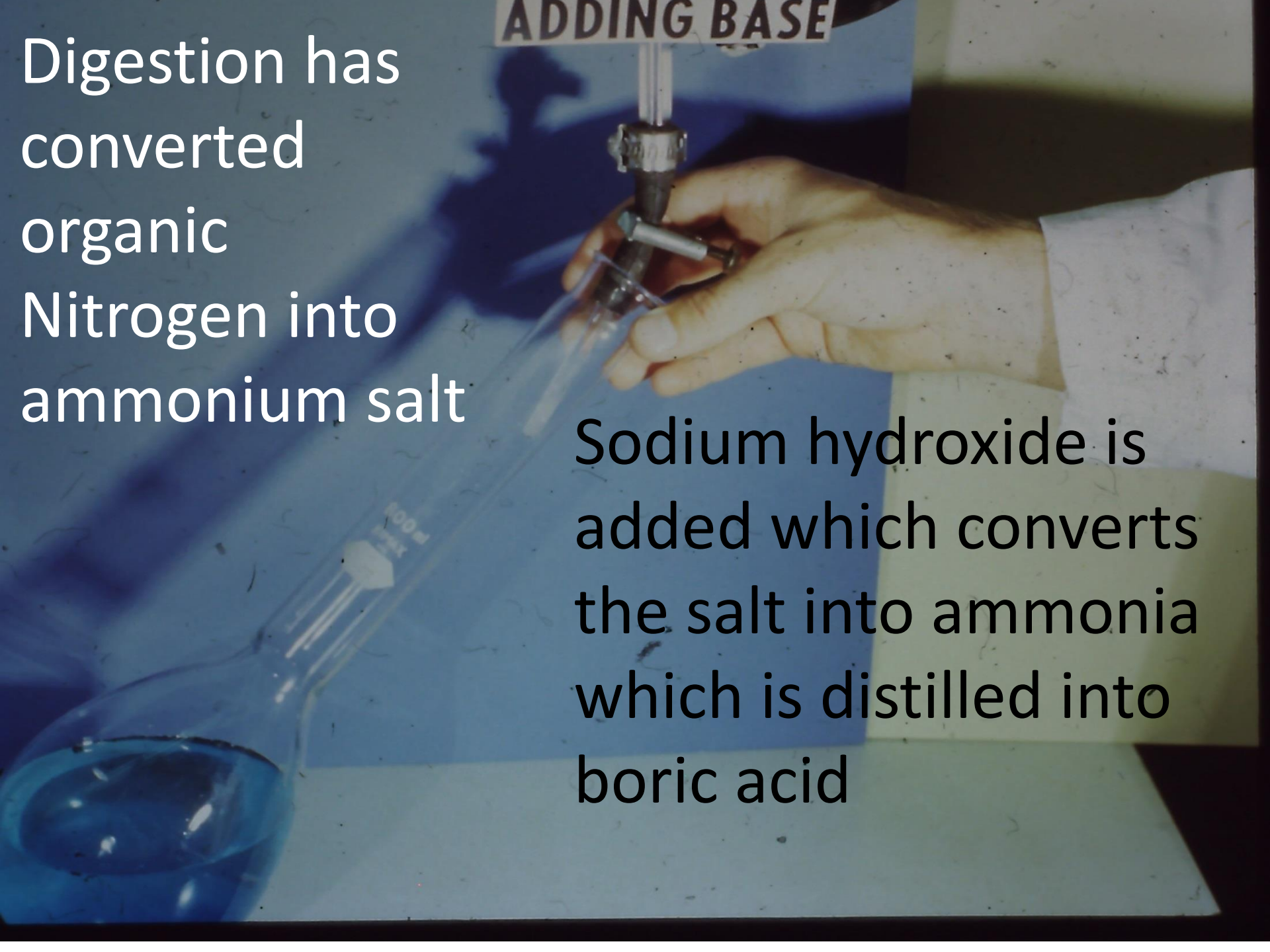


A Catalyst  
& Sulfuric  
acid is  
added to  
the flask  
and with  
the aid of  
heat  
digestion  
occurs





Time is required for digestion which will vary with fat content



Digestion has  
converted  
organic  
Nitrogen into  
ammonium salt


Sodium hydroxide is  
added which converts  
the salt into ammonia  
which is distilled into  
boric acid



Digestion is followed by distillation

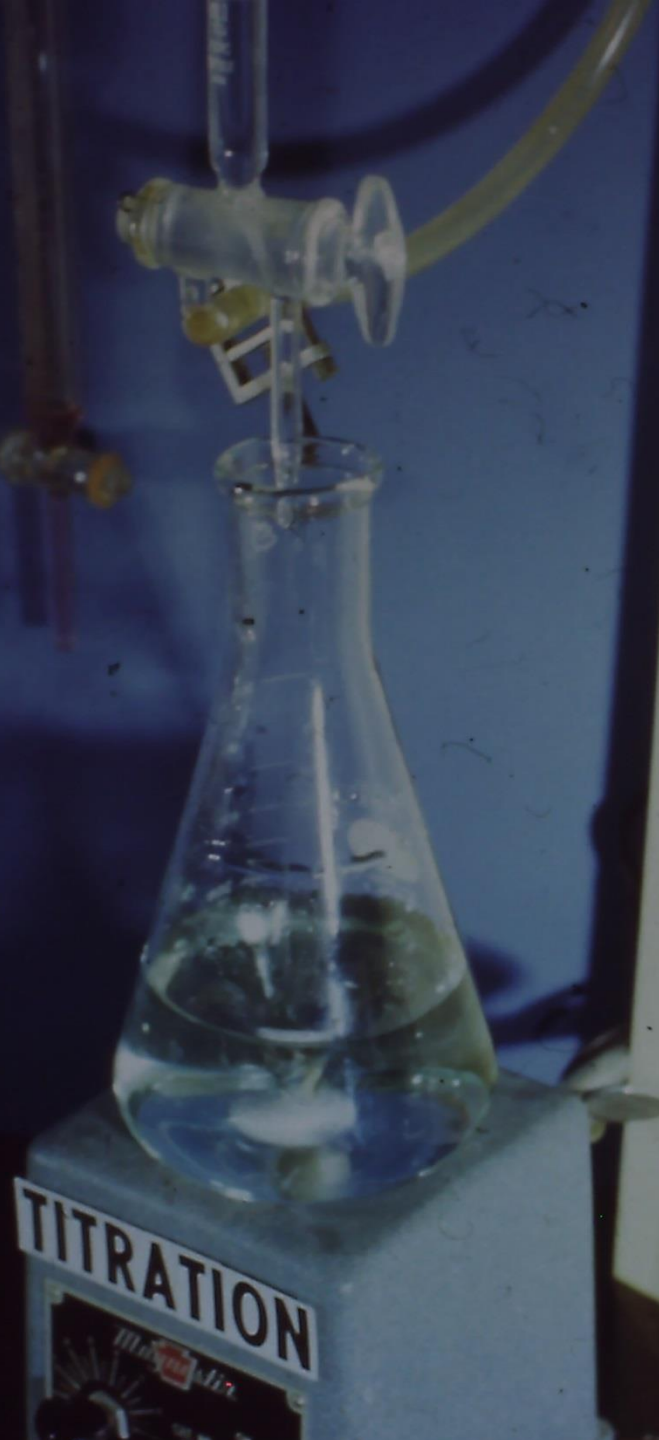




A person wearing a white lab coat is holding a red volumetric flask over a conical flask. The conical flask contains a pink liquid. The background is a blue wall.

# THE AMMONIA + BORIC ACID IS TITRATED WITH HYDROCHLORIC ACID

The Nitrogen content is multiplied by 6.25 (for meat) to obtain the protein content



Titration with the acid an with the aid of an indicator which causes a color change and considering the concentration of the acid the quantity of Nitrogen can be calculated

Color change which indicates  
an end point





## PROTEIN DETERMINATION

Acid Volume - Nitrogen

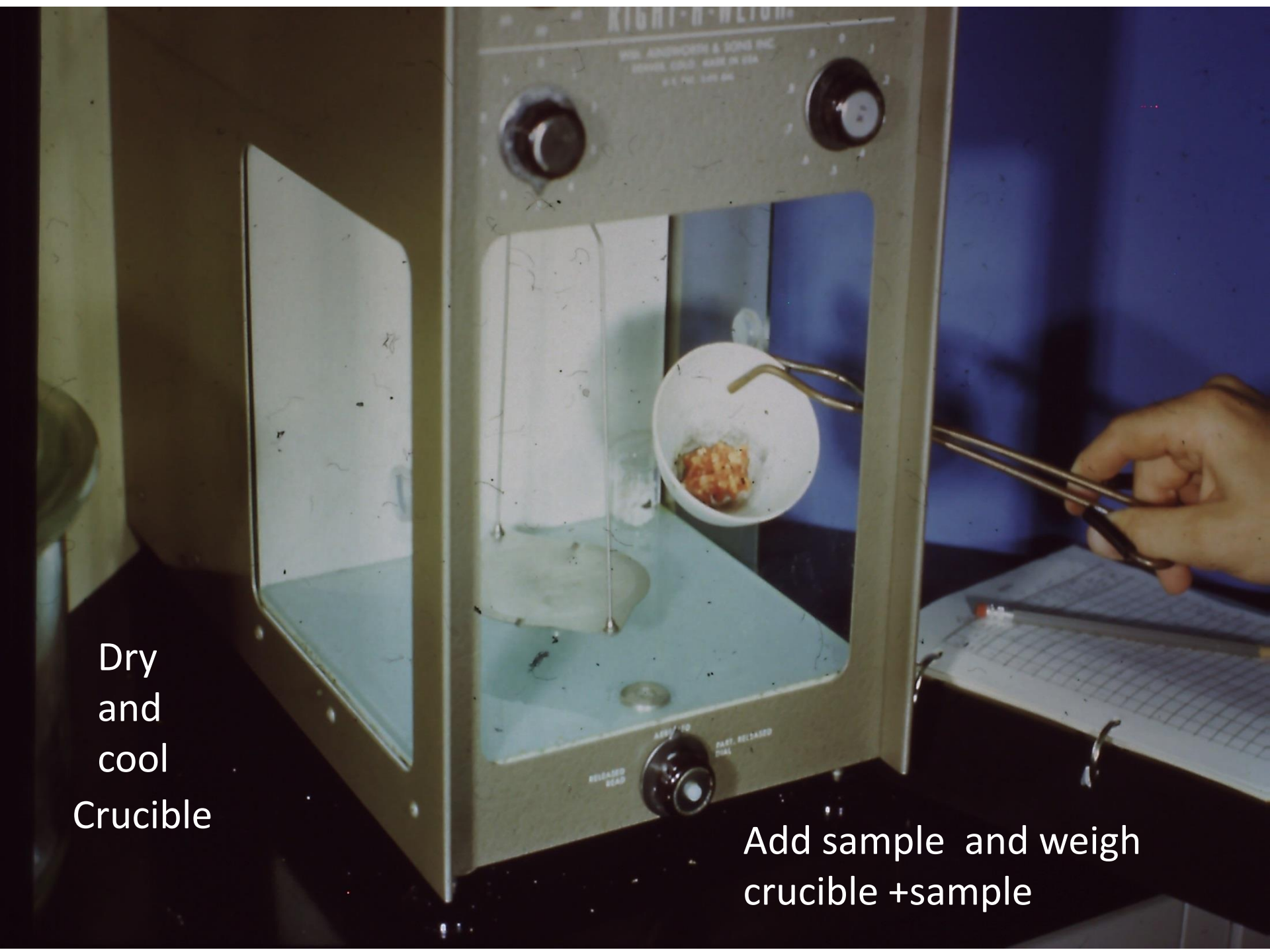
Nitrogen x 6.25 = Total Protein

$$\frac{\text{Total Protein}}{\text{Sample Weight}} = \% \text{ Protein}$$

PERCENT ASH

Dry  
and  
cool  
Crucible

Add sample and weigh  
crucible + sample





Dry  
sample

212 F

A photograph of a laboratory procedure. A hand is using long-handled tweezers to place a small, orange-brown, irregularly shaped solid sample into a white weighing boat. The boat is suspended from a balance scale. A label '212 F' is visible on the left side of the scale. The background is a metallic, industrial-looking environment.

Heat but do not  
catch on fire



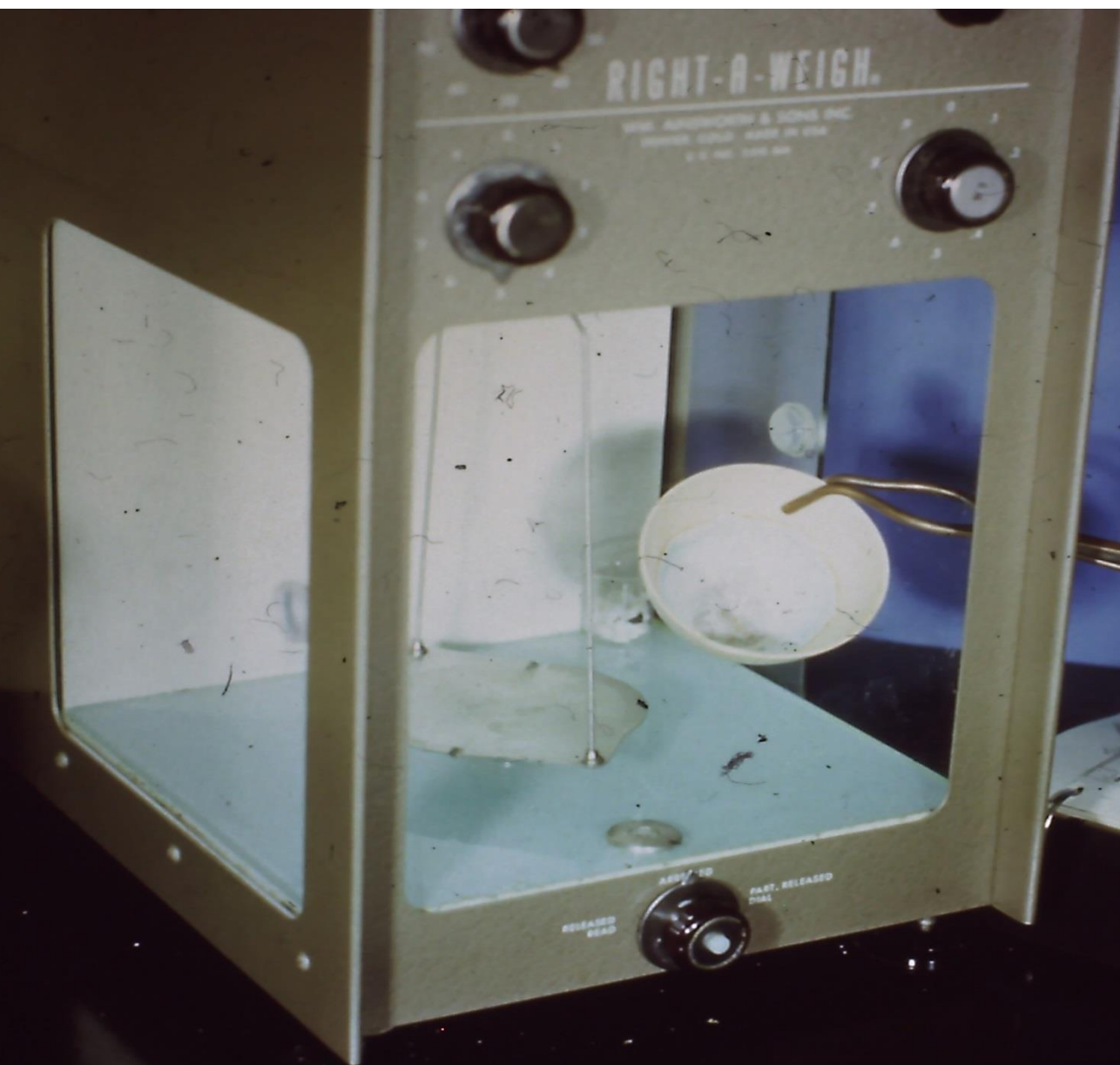


Place sample  
+ crucible in  
high  
temperature  
furnace

For 18 HOURS



Weigh  
crucible  
+ ash



## ASH DETERMINATION

5.00 g. Wet Weight

0.05 g. Weight after Ashing

0.01 = 1% Ash

$$5.00 / 0.05$$